

MARK SCHEME for the May/June 2007 question paper

5090 BIOLOGY

5090/02

Paper 2 (Theory), maximum raw mark 80

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- 1 (a) sepal(s) / calyx (R petal, A labels on diagram) ; [1]
- (b) A / left hand flower + stamen(s) / anthers / pollen / androecium
(A negatives ref. female parts named) ; [1]
- (c) (i) insect (no marks for (ii) if wrong, but mark (ii) if 'animal' or blank.)
(if they say self- or cross-pollination, A one mark max. for reasons which
must refer to named sexual part) ;
- mark the first, one per line – any **two** from:
filaments or stamens or anthers + short or protected AW,
stigma protected AW, large petals, (nectar) guides, stigma + lumpy /
compact AW / not feathery AW, (landing) platform AW ; [3]
- (ii) mtf,opl, any two from : scent AW, colour / bright AW, nectar,
pollen grains rough or sticky ; [2]
- (d) cross-pollination or explanation ;
- alleles / genes + (2) parents / plants ;
- variation (in offspring) ;
- colonisation of different habitats / wider distribution /
prevents overcrowding / less competition ;
- adaptation / natural selection / evolution or described or named e.g.
(e.g. resistance) (R references to new species) ; [max 3]
- 2 (a) large surface area (to volume ratio) / long / thin ; [1]
- (b) **D** villus/i (R microvillus) ; [1]
(or fats for one mark)
- mtf,opl, any **two** from: amino acids, fatty acids, glycerol, glucose,
ions AW (or named e.g.), drugs/toxins, water, vitamins (or named e.g.), ; [2]
- E** root hair (cell) ; [1]
- (in either order) water ;
- ions / salts / minerals / named ion / oxygen (R nitrogen) ; [2]

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- (c) (i) feature drawn and labelled (A on extra diagram)
(R mitochondria / nucleus, but A reasons – see later) ; [1]
- (ii) These must **both** be for the same feature for 2 marks, but if they do not match the label,
then **0** for label.
(membrane) living ;
partially permeable AW ;
only selected molecules enter ;
allows osmosis or described (R diffusion) ;
active transport ; [max 2]
- OR (ccw) permeable ;
tough / flexible ;
helps keep shape of cell ;
ref. part played in turgor AW ; [max 2]
- OR (cell sap / vacuole / cytoplasm)
contains concentrated solution / ref. concentration gradient ;
for water entry ;
by osmosis / diffusion ; [max 2]
- OR (for cytoplasm / mitochondria)
ref. respiration / energy release ;
for active transport ; [2]
- OR (nucleus) – for **one** mark only
controls cell activities AW ; [1]
(R e.c.f. for villus)
- 3 (a) (i) more transpiration / water lost from lower surface or v.v. ; [1]
- (ii) (A points anywhere)
waterproof AW ;
cuticle / (waxy) layer AW (must be ref. upper) (R skin) ;

correct ref. stomata / pores on upper or lower surface ;
release of water (vapour) (A only if stomata ref. has been made) ; [max 4]
- (b) mtfopl, any **two** from:
paper / slide / leaf surface not properly dry, touched with
(wet) fingers, damaged vein / xylem in leaf, slow to set up expt.
after drying, any reasonable *qualified* student error ; [2]
- (c) run the experiment more times / repeat ;
take an average ;
perform expt. on another similar leaf (R leaf of different species) ; [max 1]
- (d) Cobalt chloride paper on bench AW ;
timed (A takes less time to change) ; [2]

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- 4 (a) (i) carbohydrate / sugar / glucose / maltose / sucrose / starch ;
- (ii) protein / amino acids (vitamins / ions etc.) ; [2]
- (b) incubate / oven / suitable location ;
 optimum / increased / suitable + temperature or stated (25 – 50 °C) ;
 suitable pH ;
 correct ref. enzymes ; [max 2]
- (c) (i) H ; [1]
- (ii) bacterium (or suitable, named e.g. *Streptococcus*) ;
 antibiotics effective against bacteria AW ; [2]
- (d) (A e.c.f. for virus)
 bacteria or microorganisms mutate ;
 become resistant to antibiotic (R immune) ;
 antibiotic too readily prescribed / available ;
 patients not completing course ; [max 3]
- 5 (a) K oesophagus / gullet ;
 L duodenum / small intestine ; [2]
- (b) starch – almost the same ;
 protein – less ;
 fibre – almost the same ; [3]
 (A any symbols, but R more than one per line)
- (c) (i) digested / changed / broken down / ref. enzyme action ;
 to amino acids / (poly)peptides AW ;
 absorption (available only with ref. amino acids) ; [max 2]
- (ii) colon / rectum / large intestine ;
 no suitable enzyme / not digested ;
 ref. cellulose / lignin ;
 therefore no absorption / egested as faeces / used in peristalsis ;
 (A all other things, or named substances, are absorbed) ; [max 3]

[Maximum mark for Section A: 50]

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- 6 (a) **Q** (A so long as **Q** or **R** are mentioned – if no ref **Q** or **R**, max 2 for each)
- eaten as proteins ;
- ref. urine / faeces AW (I excretion refs. re. faeces) ;
- urea ;
- (ers) ;
- decompos(ition) / decay / putrefaction or described ;
- nitrification or described ;
- correct ref. bacteria / fungi or named ;
- nitrates + proteins + plants ;
- (max 5 marks from above) ;
- R** carbon dioxide ;
- from combustion AW ;
- respiration (R if ref. only to oxygen) ;
- photosynthesis + carbohydrates / named carbohydrate ;
- (A on word equation) ;
- [max 7]
- (b) two from: ;
- an oxide of nitrogen, SO₂, CO₂, CO, ;;
- one from: ;
- acid rain (for N_xO_y or SO₂ or CO₂) / global warming or greenhouse ;
- effect AW (for CO₂ or CO) / CO + ref. carboxyhaemoglobin ; [3]
- [Total: 10]
- 7 (a) (R any examples which do not come from the circulatory system, mark the first in a list.)
- (i) blood cell / any correct named e.g. ;
- (ii) muscle or correct named e.g. (A blood / capillary) ;
- (iii) heart / blood vessel or named (R capillary) ; [3]
- (b) hepatic artery (A name, disregard context) ;
- carries more / most oxygen / oxygenated blood ;
- more or ref. to being used or destroyed in the liver + insulin / glucagon / ;
- adrenaline / hormones ;
- hepatic vein (A name, disregard context) ;
- carries carbon dioxide / deoxygenated (A with ref. HPV) ;
- urea / ref. more amino acids in hepatic artery ;
- any reasonable ref. to comparative numbers of RBCs + named blood vessel ;
- (hepatic) portal vein / HPV (A name, disregard context) ;
- #digested foods / any named ;
- #ions / vitamins / water ;
- any correct ref. to glucose levels in hepatic artery / vein ; [max 7]
- (#both marks require a ref. somewhere to direction of blood flow)
- [Total: 10]

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8E (a) externally administered substance AW / chemical ;
 which modifies / changes / affects ;
 metabolism / chemical reactions in the body AW ; [max 2]
 (could be of bacteria)

(b) (alcohol) reduces self-control / removes inhibitions ;
depressant / ref. nervous system ;
 slower reaction times or any named effect ;
 liver damage / cirrhosis / other named condition ;
 *expense ;
 *social implications / crime ;
 (heroin) depressant / ref. nervous system ;
 *addiction / greater quantities for same effect / habituation / tolerance ;
 withdrawal symptoms AW ;
 needle-sharing ;
 AIDS / hepatitis ; [max 8]
 (Points marked * score *either* for alcohol *or* for heroin)

[Total: 10]

8O (a) nicotine ;
 *craving / addiction / agglutination or clotting of RBCs / increased ;
 blood pressure / increased heart rate / vasoconstriction / increased ;
 blood fat / atheroma AW / arteriosclerosis / effect on fetus ;
 (*All must be with ref. nicotine)

tar ;
 decreased O₂ uptake (must be with ref. tar) ;
 lung or any named correct form of cancer caused by tar ;

CO ;
 decreased O₂ carriage (must be related to CO) ;

points not tied to any particular constituent:
 emphysema / bronchitis / cough / destruction of cilia ;
 heart disease / heart attack / stroke / atheroma (if not given above) ;
 less O₂ to fetus ;
 miscarriage / small / underweight babies (R underdeveloped) ; [max 8]

(b) smell / eye discomfort ;
 ref. passive smoking or described ;
 risk to health of non-smoker / ref. litter ; [max 2]

[Total: 10]